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REST AND EXERCISE.

PERSONAL hygiene is the science of individual health. From birth to old age health is not uniform, for it varies at different epochs; but, with care, a reasonable measure of it may be attained throughout life and at every period of it provided, of course, that the stock from which our life is drawn is healthy. What we understand by *health* is that state which allows of some exertion of brain and muscle without any painful sense of fatigue; but owing to the complexity of the human body and the varying conditions of health and strength, it is impossible to lay down any fixed rule which shall determine the amount of work the average healthy man can do. By attention to rules of living and habits of life, we preserve health, and by neglect, we forfeit it.

However we look at life, two facts stand out in bold relief—that we must work, and that we must rest; the latter being a sort of storehouse, supplying to the former the power necessary for maintaining a constant equilibrium. It is an old saying that 'All work and no play makes Jack a dull boy.' An entirely sedentary life cannot be healthy for body and mind; and when the struggle for existence becomes so severe that men and women are unable to find any leisure moments for outdoor muscular exercise, the time has arrived for wars, famines, and diseases to sweep off masses, so as to render the competition less keen.

It has been found that, for a healthy, strong adult, the amount of voluntary force he is capable of, without injury to health, in a day's work equals three hundred tons lifted one foot. According to Professor Parkes, to preserve health, a man should take an amount of exercise equal to raising one hundred and fifty tons one foot; or, in other words, walk nine miles daily at least. Now, although we are more guided by personal experience, still it will be found that those who maintain good health have carried out to a large

extent the rules laid down by scientific men for healthy life.

Jeremy Taylor says: 'Every day's necessity calls for a reparation of that portion which Death fed on all night, when we lay in his lap and slept in his outer chambers.' The very spirits of a man prey upon the daily portion of bread and flesh; and every meal is a rescue from one death, and lays up for another. And while we think a thought we die, and the clock strikes, and reckons in our portion of eternity. We form our words with the breath of our nostrils; we have the less to live upon for every word we speak.'

Every thought which flashes through the mind, as well as every muscular movement, is an exhibition of nerve-force; and the greater the energy put forth by any part of the body, the larger is the amount of blood supplied. This energy is derived from two sources—the oxygen we breathe, and the food we eat. Whenever a muscle contracts, three things happen: (1) an increased blood-supply, (2) an increase of carbonic acid and other waste matters, (3) an elevation of temperature, so that the greater the activity of our bodies the larger the amount of deleterious substances formed; and it is to this healthy activity and change that the happiness of our lives is mainly due. The late Professor George Wilson of Edinburgh, when speaking of blood-supply, said that 'those wondrous crimson barks or blood-cells which navigate the arteries are keen traders, and follow the rule of the African rivers, where sales are only effected by barter; but they add to this rule one peculiar to themselves, which neither civilised nor savage man cares to follow—namely, that they give away new goods in exchange for old.'

The carbonic acid escapes chiefly by the lungs and the skin, both acting more vigorously during muscular exercise than when at rest; and it has been calculated that if, in lying down, the air inspired be one volume, in walking one mile an hour it will be increased 1.9 volume, in riding to four volumes, and in active exercise five and a half volumes. The skin acts as a kind of

safety-valve, for not only does it get rid of carbonic acid by *perspiration*, but by evaporation it tends to keep down an undue temperature, by allowing the heat, produced by muscular exercise, to escape.

If coal is placed in the furnace of an engine and air freely admitted, it will burn when set alight; but if you carefully shut off all access of air, there will be no flame, and therefore no force. What starts the action is *oxygen gas*, of which there are two parts in every ten of air. Fresh air when admitted into the lungs contains twenty-one per cent. of oxygen, and four parts in ten thousand of carbonic acid. Expelled air contains only thirteen per cent. of oxygen, and five hundred parts in ten thousand of carbonic acid gas. In our bodies we have the same process going on as is seen in the glowing furnace of an engine. Fuel in the shape of food is conveyed by the blood, and along with it is carried in the red corpuscles the life-giving oxygen; and in both cases the chief products of combustion are the same—water and carbonic acid.

The aqueous vapour arising from the breath contains a minute proportion of organic matter. That this is highly poisonous has been proved experimentally by Dr Hammond, who placed a small animal under a bell-glass well supplied with air and free from the influence of carbonic acid gas; but in less than an hour it died, poisoned by the emanations from its own body. It is this material that gives the peculiar close smell to confined spaces. It has been proved, that when air contains six parts of carbonic acid to ten thousand there is sufficient organic contamination to be extremely detrimental to health. It floats in the atmosphere in the same manner as motes move in a sunbeam, and finally, quietly settles down, if not swept away by free ventilation into the upper depths of the air.

Two thousand gallons of air unfit to support life pass through our lungs in twenty-four hours, and more than six parts of carbonic acid in ten thousand is sufficient to cause ill-health, and to prevent this result, ten thousand gallons or three thousand cubic feet of fresh air at least are necessary every hour day and night; for without that, a healthy condition of body cannot be maintained. These facts prove how requisite it is to spend a great portion of our time in the open air; and on a bright day when the sun is sailing like a golden galleon through a sapphire sky, we all feel the electric thrill of life pervading every fibre, every nerve, and every vein throughout our whole being. The soft air fans health into our cheeks, the woods are bathed in light, the valleys glow; we see the rippling currents of the river, and we hear upward in the mellow blush of day the lark carolling forth his sweet and joyous hymn.

It is recorded of the famous King Alfred that he devoted eight hours of the twenty-four to labour, eight to rest, and eight to recreation; and the division is not at all a bad one. The following table of Friedländer shows how the

twenty-four hours should be divided from seven to fifteen years of age:

Age.	HOURS FOR			
	Exercise.	Work.	Leisure.	Sleep.
7	8	2	4	9 or 10
8	8	2	4	9 or 10
9	8	3	4	9
10	8	4	4	8
11	7	5	4	8
12	6	6	4	8
13	5	7	4	8
14	5	8	4	7
15	4	9	4	7

The youngest infants require sunlight and open air, and as soon as they can crawl about they should be encouraged to do so, thus stretching their limbs and co-ordinating their muscular movements. The reason they indulge in so much sleep is because in infancy the growth of the brain is most rapid. In childhood there is great muscular activity and constant use of the senses, and these parts stand in need of a large amount of repose. Puberty is the age for exercise, and as then the body is most rapidly growing, the evil of unilateral employment of muscles is very baneful. Sitting over-long in a slouching attitude will tend to contract the chest, as conveying cumbersome weights over the back will disfigure the normal spinal curves; standing too much on one leg, or a pocketful of articles on one side of the dress, will produce spinal curvature. Lawn-tennis, cricket, rowing, bicycling, skating, riding and everything which brings into play every muscle is essential. Erectness, firmness and good balance of mind and body, testify to a man as to a racehorse or greyhound, and an experienced eye recognises at a glance the particular build of man likely to excel in particular exercises. One great mistake in recreation is the making of great strength in one set of muscles, instead of good general health, the object aimed at. Our grand aim should be the culture of all our powers, so as to enable us to pass through life without pain, without disease, and to preserve it as long as possible.

Fatigue is due to temporary exhaustion, general or local, and by it we become aware that we have worked hard enough; but by gradually increasing the work done by any group of muscles they develop in bulk and are adapted to the extra work. The limit of size is, however, soon reached, and if the exercise is too great the muscles cease growing and a process of degeneration sets in. On the other hand, idleness will, through disuse, lead to a like result; but it would not be a difficult task to prove that overwork does less harm than underwork, and it behoves every one so to use their powers, whatever they may be, that in after-years they cannot look back in bitter reflection on a life half wasted. To renew the vigour of wearied muscles we require a sufficient blood-supply, and this, as a rule, can be best obtained not only by rest, but also by exercising the muscles of another part of the body. But what is one man's work is another man's play; to brain-workers, physical exertion is a recreation; to him who has worked hard at manual labour, a book and a quiet pipe is rest.

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happiness of every one that they should have certain intervals of rest from their work; and by rest we do not simply mean sleep, but whatever gives pleasure and promotes health. Change of employment, when innocent in itself and in its tendencies, fulfils these objects; and the sports of the field are the best of all, in that they are enjoyed in the open air, in daylight, and demand, as a rule, early rising. But whatever exercise is taken it should be graduated and systematic, not violent and sudden, and neglect of these precautions often causes more mischief than no exercise at all.

Sleep ensures rest in its highest degree, and rest is necessary for repair, as all action, whether of mind or body, involves destruction, and without sleep and rest destruction would proceed so much more rapidly than repair that our powers would soon fail altogether, as it is probable that muscular and mental fatigue are due to the waste having outrun repair. Even plants are said to sleep, and they certainly undergo changes which suggest a waking and sleeping condition. At evening flowers close and buds fold up, not to open until morning. The intensity of sleep reaches its maximum depth within the first hour and then it diminishes at first rapidly, and afterwards slowly. 'At the end of an hour and a half, it falls one-fourth; at the end of two hours, to one-eighth of its maximum intensity; and thence onwards it diminishes with gradual diminishing decrements.' Different constitutions require different amounts of sleep; but to sleep easily, soundly, and awake refreshed, is rightly considered a sign of good health. Wordsworth well observes,

Without thee, what is all the morning's wealth?

Come, blessed barrier between day and day,

Dear mother of fresh thoughts and joyous health.

Too much, however, dulls the intellect and weakens the recuperative faculties; whilst too little prevents the repair of the nervous system. John Wesley says that any one can discover how much sleep he really requires by rising half an hour earlier every morning until he finds he no longer lies awake on going to bed, or awakes until it is time for him to get up. Six to eight hours appear ample for healthy adults, with nine hours every seventh day; and it must not be forgotten that mental over-fatigue is to be got rid of by bodily exercise in the open air, as this directs the blood from the head to the muscles. A man engaged in intellectual work can rest his brain during the day by turning to some other pursuit, and does not therefore require an increased amount of sleep; but one occupied in physical labour must proportion his sleep to the amount of daily strain imposed on his muscular system.

Intense study drives away slumber; prolonged muscular toil makes it impossible to keep the eyes open. The result in the one case is due to the circulation in the brain becoming more active with mental effort; and in the other to the increased blood-supply to the muscles producing a comparatively bloodless condition of the brain; and this latter state is supposed to be always present during sleep. When people get into the habit of sitting up, it is no easy matter to break them of it; and if they go to bed late they cannot rise early. It is said by the country

people that one hour's sleep before midnight is worth more than two after; but as a matter of fact it is useless going to bed early and rising with the sun if the time be not well employed after getting up. The great thing to remember is that health is the most valuable of all earthly possessions and without it the rest are worth nothing.

In conclusion we may remark that although dirt is defined to be only 'matter in the wrong place,' we must remember that 'cleanliness is next to godliness,' and be prepared with soap and water to wage a vigorous war against the enemy.

DUMARESQ'S DAUGHTER.

BY GRANT ALLEN, AUTHOR OF 'IN ALL SHADES,'
'THIS MORTAL COIL,' ETC.

CHAPTER VII.—AT THE UNITED SERVICE.

WHEN General Maitland returned a week later from the Métropole Hotel to High Ash, Petherton, it was with conscious rectitude and the sense of a duty performed that he remarked to his wife: 'Well, Maria, I went to the club, and I've found out all about that painter fellow.'

As a matter of fact, indeed, it was with no small persistence that that gallant soldier had prosecuted his inquiries in London town into the Linnell pedigree.

In the smoking-room of the Senior United Service Club, a few days after his arrival in town, he had chanced to light upon Sir Austen Linnell, the supposed cousin of their Algerian acquaintance. Sir Austen, a cold and reserved man, was very full at the moment of his preparations for going to Egypt to join Gordon at Khartoum by special invitation. Those were the days of the forlorn hope, while communications up the Nile were yet clear, before the Mahdi's troops had begun to invest the doomed city; and Sir Austen had obtained leave, he said, to accept a call from Gordon himself to form one of his staff in the capital of the threatened but still unconquered Soudan. This was the very moment for inquiring, clearly. General Maitland fastened himself upon Sir Austen with avidity, and listened patiently to all his details of the outfit he ought to take for the Upper Nile journey, and of the relative advantages of the rival routes via Assouan or Suakim to the heart of Africa. At last, Sir Austen paused a little in his narrative; and the General, thinking an appropriate moment had now arrived, managed to remark casually: 'By the way, Linnell, we've a namesake of yours stopping down at Petherton just at present. I wonder whether he and you are any relations.'

Sir Austen's brow gathered slightly. 'A painter fellow?' he asked with a contemptuous intonation.

'Well, he certainly paints,' the General answered, with some faint undercurrent of asperity in his tone, for he didn't quite care to hear a possible son-in-law of the Maitlands of High Ash thus cavalierly described; 'but I'm not sure whether he's a regular artist or only an amateur. I think he paints for amusement chiefly. He seems to be coiny. Do you know anything of him?'

'I've heard of him,' Sir Austen replied curtly, perusing the ceiling.

'His name's Austen Linnell too, by the way,'

the General went on with bland suggestiveness. 'Charles Austen Linnell, he calls himself. He must belong to your family, I fancy.'

Sir Austen raised his shoulders almost imperceptibly. 'A' Stuarts are na sib to the king,' he answered oracularly, with the air of a man who desires to close, offhand, an unseasonable discussion. And he tapped the table as he spoke with one impatient forefinger.

But General Maitland, once fairly on the scent, was not thus to be lightly put down. He kept his point well in view, and he meant to make for it with soldierly instinct in spite of all obstacles. 'The man has money,' he said, eyeing Sir Austen close and sharp. 'He's a gentleman, you know, and very well educated. He was at Christ Church, I imagine, and he travels in Africa.'

'I daresay he has money,' Sir Austen retorted with a certain show of unwonted petulance, taking up a copy of 'Vanity Fair' from the table, and pretending to be vastly interested in the cartoon. 'And I daresay he travels in Africa also. A great many fellows have money nowadays. Some of them make it out of cats'-meat sausages. For my own part, I think a sort of gentlemanly indigence is more of a credential to good society at the present day than any amount of unaccountable money. I know I can never raise any cash myself, however much I want it. Land in Rutland's a drug in the market, to be had for the asking. If your friend wants to rent an ancestral estate, now, on easy terms, on the strength of a singular coincidence in our Christian and surnames, I shall be happy to meet him through my agent any day with a most equitable arrangement for taking Thorpe Manor. If he chose to live in the house while I'm away in Africa (where those confounded Jews can't get at me anyhow), he might make a great deal of social capital in the county out of the double-barrelled resemblance, and perhaps marry into some good family, which I suppose is the height of the fellow's ambition.' And Sir Austen, laying down the paper once more, and puffing away most vigorously at his cigar, strode off with long strides, and without further explanation vouchsafed, to the secure retreat of the club billiard-room.

His reticence roused General Maitland's curiosity to almost boiling-point. 'A' Stuarts are na sib to the king,' Sir Austen had said; but he had never explicitly denied the relationship. Who could this painter Linnell really be, then; and why should the putative head of his house speak with so evident a mixture of dislike and envy about his supposed fortune? The General was puzzled. He looked around him with a comical air of utter despair, and roped his gray moustache to right and left in sore perplexity.

As he gazed round the room, airing his doubts visibly, his eyes chanced to fall upon old Admiral Rolt, seated on a divan in the far corner, and looking up from his perusal of the 'Piccadilly Gazette' with a curious twinkle about his small fat pigs'-eyes. General Maitland nodded a cursory recognition; and the Admiral, laying down his paper nothing loth, in the midst of a brilliant and vehement leader on the supineness of the service and the wickedness of the Administration, waddled across the room on his short fat legs slowly to meet him. 'You were asking Linnell about that

Yankee cousin of his,' he said with his oily gossipy smile—for the Admiral is the licensed tattle-monger of the Senior United Service. 'Well, if you care to hear it, I know that story well from beginning to end. Seen it all through from the day it was launched. Met my old shipmate, the painter fellow's father, in Boston long ago, when I was cruising about on the North American station, and gave him a lift once to Halifax in the old wooden *Bellerophon*, the one that was broken up after Bosanquet's haul-down, you recollect, when I got my promotion. Knew all his people in Rutland, too, from the time I was a baby; and the lady as well: dear me, dear me, she *was* a clever one. Best hand at a page or a saucy chambermaid I ever saw in my born days; and as full of cunning as Canton is of Chinamen.'

'Then they *are* related?' the General asked cautiously.

'Related! Who? Linnell and the painter? My dear sir, I believe you. First-cousins, that's all: own brother's sons; and unless Sir Austen has a boy of his own before he dies, you take my word for it, that lame painter man's the heir to the baronetcy.'

'You don't mean to say so!' the General cried, surprised.

'Yes, I do, though. That's it. You may take my word for it. Very few people nowadays know anything about the story—blown over, long ago, as things do blow over: and Linnell himself—Sir Austen, I mean—won't for a moment so much as acknowledge the relationship. It's not in the Peerage. Linnell don't allow it to be put in—he disclaims the connection: and the lame fellow's a sight too proud and too quixotic to meddle with the family dirty linen. He doesn't want to have the whole bundle dragged to light, and Sir Austen blackguarding his father and mother in every house in all London. But if ever Sir Austen dies, you mark my words, the painter fellow'll come into Thorpe Manor as sure as my name's John Antony Rolt, sir. It's strictly entailed: property follows the baronetcy in tail male. Linnell's done his very best to break the entail, to my certain knowledge, in order to cut off this Yankee cousin: but it's no go: the law can't manage it. The lame man'll follow him as master at Thorpe to a dead certainty, unless Lady Linnell presents him with an heir to the title beforehand—which isn't likely, seeing that they've been over five years married.'

'But why does Linnell object to acknowledging him?' the General asked curiously.

'Well, it's a precious long story,' the old sailor answered, button-holing his willing listener with great joy—a willing listener was a godsend to the Admiral: 'but I'll tell you all about it in strict confidence, as I know the ins and outs of the whole question from the very beginning. It seems Sir Austen Linnell the elder—you remember him—the thin old fellow with the cracked voice who was once in the F. O., worse luck, and got us into that precious nasty mess with the Siamese about the Bangkok bombardment—well, that Sir Austen, the present man's father, had a brother Charles, a harum-scarum creature with a handsome face and a wild eye, who was a messmate of mine as midshipman on board the

Cockatrice. The *Cockatrice* one time was stationed at Plymouth, and there we all fell in with an awfully pretty dancing-girl, one Sally Withers; her real name was, I believe, in private circles; but they called her at the theatre, if you please, Miss Violet Fitzgerald. So what must Charlie Linnell and this girl Sally do, by George, but get very thick indeed with one another: so thick at last that there was a jolly row over it, and Sir Austen the eldest, who was then living—not the F. O. man, you understand, but his father again, the Peninsular hero, who died afterwards of the cholera in India—came down to Plymouth and broke the whole thing completely up. He carried off Charlie in disgrace to town, dismissed Miss Sally Violet Fitzgerald to her own profession, spirited her away with her troupe to Australia, and made poor Charlie resign his commission, which he was permitted to do at headquarters on easy terms, to prevent some scandal about a forged leave of absence or something from the Port Admiral.

'But then this man Linnell the painter isn't'—

'Just you wait and hear. That ain't by any means the end of the story. An old sailor must take his own time to spin his yarn.—Well, Charlie, he settled down to a respectable life in town, and was pitchforked by his father into a jolly good berth in the backstairs of the War Office, and grew religious, and forswore the theatre, and took to getting up penny readings, and altogether astonished his friends and acquaintances by developing into a most exemplary member of society. Quite an evolution, as folks say nowadays. Some of us had our doubts about the change, of course, who'd known Charlie in the noisy old days on board the *Cockatrice*: but bless your heart, we said nothing: we waited to see what'd be the end of it all. In time, if you please, Master Charlie announces, to our great surprise, he's going to be married; to a second-cousin of his, twice removed, the daughter of a Dean, too, an excellent match, down at Melbury Cathedral. So in due course the marriage comes off, the Dean officiating, and everybody goes into raptures over the bride, and says how wonderfully Charlie has quieted down, and what an excellent man lay hid so long under his brass buttons and his midshipman's uniform. It was "West African Mission Meeting; Charles Linnell, Esquire, will take the chair at eight precisely." It was "Melbury Soup Kitchen; Charles Linnell, Esquire, Ten Guineas." It was "Loomshire Auxiliary, Charles Linnell, Esquire, President and Treasurer." You never in your life saw such a smooth-faced, clean-shaven, philanthropic, methodistical, mealy-mouthed gentleman. He was the very moral of a blameless ratepayer. But under it all, he was always Charlie.'

'And the painter, I suppose, is a son of this man's and the Dean's daughter?' General Maitland interposed, anxious to get at the pith of the long-winded story.

'Don't you believe it,' the Admiral answered energetically, with a small fat wink. 'The Dean's daughter had one nice little boy, to be sure, whom the present Sir Austen still acknowledges as a sort of cousin; but that's neither here nor there, I tell you: he's a parson in Northumberland now, the Dean's grandson, and

nothing at all to do with this present history. About three months after that boy was born, however, what should happen but a party of strolling players comes round to Melbury, where Charlie happened to be stopping at the time with his papa-in-law, the Dean, and accepting hospitality from his revered and right reverend friend, the Bishop. Well, the Dean, who was a good sort of body in his way, was all for converting the actors and actresses; so he invited them in the lump from their penny gaff to a meeting at the Deanery, Charles Linnell, Esquire, the eminent philanthropist, to deliver a nice little fatherly address to them. Charlie made them a most affecting speech, and everything went off as well as could be expected till the very last moment; when, just as they'd finished their weak tea and penny buns, and Charlie was moving away with great dignity from the chair, which he'd filled so beautifully, what should happen, but a bold good-looking player woman, whom he hadn't noticed in a dark corner, gave him a dig in the ribs, and called out to him in a fine broad Irish brogue—she'd played some Irish part when Charlie was stationed on the *Cockatrice* at Plymouth—"Och, Charlie, ohone, sure an' it's yourself's the hoary old hypocrite! Don't ye know me, thin, for your wedded wife, Misthress Linnell, me darlin', fresh back from Australia?" And true enough that's just what she was, as it turned out afterwards: for Charlie'd married Miss Sally Violet quite regularly at Plymouth half-a-dozen years before.'

'What, bigamy!' the General cried in almost mute surprise.

'Ah, bigamy, if you choose to put an ugly name to it: that's just about the long and short of it. But anyhow, there was a regular burst-up that very evening. In twenty-four hours Charlie had disappeared: the eminent philanthropic gentleman had ceased to exist. Miss Sally Violet, who *was* a clever one, and no mistake, and as handsome a woman as ever I set eyes upon, bar none, had got him straight under her pretty little thumb again: he was just fascinated, clean taken by surprise; and next week, it was all about over every club in London that Charlie Linnell had eloped with her from Liverpool for somewhere in America, and the Dean's daughter was once more a spinster.'

'What a painful surprise!' the General said, constrainedly.

'Painful? You may say so. Poor Mrs Linnell the Second, the Dean's daughter, nearly cried her wretched little black eyes out. But the family stuck by her like bricks, I must say. Sir Austen the eldest declared he'd never acknowledge Mrs Linnell the First as one of the family, and he left what he could to Mrs Linnell the Second and her poor little baby, the parson in Northumberland. Meanwhile, Charlie'd gone off on his own hook to Boston, you see, with five thousand pounds, saved from the wreck, in his waistcoat pocket, unable to come to England again of course as long as he lived, for fear Mr Dean should prosecute him for bigamy; but with that clever little wife of his, the Sally Violet creature, ready to make his fortune for him over again in America. She hadn't been there but a year and a day, as the old song says, when this new painter baby appears upon the scene, the

legitimate heir to the Linnells of Thorpe Manor. Well, clever little Mrs Sally Violet, she says, says she to Charlie: "Charlie, my boy," says she, "you must make money for the precious baby."—"How?" says Charlie.—"A pill," says Sally.—"But what the dickens do I know about pills, my dear?" says Charlie, flabbergasted.—"What's that got to do with the question, stupid?" says sharp Mrs Sally. "Advertise, advertise, advertise, is the motto! Nothing can be done in this world without advertisements." So she took Charlie's five thousand into her own hands and advertised like winking, all over the shop, till you couldn't go up the White Mountain Peak without seeing in letters as big as yourself on every rock, "Use Linnell's Instantaneous Lion Liver Pills." Podophyllin and rhubarb did all the rest, and Charlie died a mild sort of a millionaire at last in a big house in Beacon Street, Boston. This fellow with the game leg inherited the lot—the ballet-girl having predeceased him in the odour of sanctity—but I understand he made over a moiety of the fortune to his half-brother, the parson in Northumberland, Mr Dean's grandson. He said his father's son was his father's son, acknowledged or unacknowledged. And he for his part would never do another the cruel wrong which the rest of the world would be glad enough to do to himself if they had the opportunity.

"That was honourable of him, at anyrate," the General said dryly.

"Honourable of him? Well, yes, I grant you that; honourable, of course, but confoundedly quixotic. The fellow's all full of this sentimental nonsense, though. He won't lay claim to the heirship to the baronetcy in the Peerage, it seems, because the other son's well known in England, and he won't brand his own half-brother with bastardy, he says, whatever comes of it. His own half-brother, by the way, the parson in Northumberland, though he owes his fortune to him, hates him like poison, and would brand him with bastardy or anything else as soon as look at him. And then he's got ridiculous ideas about his money generally: doesn't feel sure the paternal pills ever did any good in the world to anybody to speak of, though I believe they're harmless, quite harmless, and I used to take them myself for years on the North American Station, where one needs such things in the hot season. But this young fellow has doubts as to their efficacy after all, it seems, and is sensitive about the way his money was made: says he holds it in trust for humanity, or some such high-falutin' new-fangled nonsense, and would like to earn his living honestly if he could by his own exertions. Charlie sent him over to be educated at Oxford (though of course he couldn't come himself), as he wanted to make an English gentleman of him. He spends the best part of his fortune in charity, I believe, encouraging people he thinks should be encouraged, and pensioning off everybody who suffered in any way however remotely by his father's doings. He's quite quixotic, in fact, quite quixotic."

"If he thinks it's right," the General said quietly—for he believed in duty, like an old-fashioned soldier, and was not ashamed to deal in moral platitudes, "he ought to stick to it.—But," he added, after a short pause, "if he were

to marry any nice girl anywhere, I expect he'd turn out much like all the rest of us."

"Eh, what's that?" the Admiral cried sharply, peering out of his fat little black eyes like a wide-awake hedgehog. "Marry a nice girl? Ah, yes, I daresay—if any nice girl can only manage to catch him. But the man's as full of fads and fancies as a school-girl. Suspicious, suspicious, suspicious of everybody. Thinks people look down upon him because he's lame. Thinks they look down upon him because his mother was only a ballet-girl. Thinks they look down upon him because his father ran away to America. Thinks they look down upon him because the Linnells of Thorpe Manor won't acknowledge him. Thinks they look down upon him because his money was made out of pills. Thinks they look down upon him for what he is and for what he isn't, for what they think him and what they don't think him. And all the time, mind you, knows his own worth, and doesn't mean to be caught for nothing: has as keen an idea of the value of his money, as perfect a sense of how much the world runs after seven thousand a year, and as good a notion of his own position as heir-presumptive to an old English baronetcy, as any other man in the three kingdoms. But the Linnells were always unaccountable people—most odd mixtures: and even Charlie, in spite of his high jinks and his barefaced hypocrisy, was chock-full of all sorts of high-flown notions, for all that. They say he loved the ballet-girl right through, like a perfect fool, and was only persuaded to marry the Dean's daughter at last by his father swearing she was dead and buried long ago at Plymouth. When I met him at Boston, years after, in the liver-pill business, there he was, billing and cooing with Miss Sally Violet as fondly as ever, and as madly devoted to this lame boy of theirs as if his mother had been a duchess's daughter."

And later in the day, when General Maitland had retired to his own room at the Métropole, the Admiral was button-holing every other flag-officer in the whole club, and remarking, with his little pigs'-eyes as wide open as the lids would permit: "I say, So-and-so, have you heard the latest thing out in society? Maitland's girl's trying to catch that Yankee artist fellow, Linnell's cousin!"

THE NICARAGUA CANAL.

ACCORDING to the Report of the official liquidator of the Panama Canal Company, published in Paris in August last, the total amount expended by the company was fifty-two and a half millions sterling. For this there is now practically nothing to show but a few rows of tenantless buildings at Panama, dismantled machinery, grass-grown cuttings, broken vehicles, and a full cemetery. What has been the cost in human life of M. de Lesseps' rash enterprise has not yet been estimated; but the extent of the pecuniary loss involved in it may be inferred from the fact that the liquidator values the assets of the company at only six hundred and forty thousand pounds!

In the meantime, then, it may be assumed that the project of a waterway across the Isthmus of

Panama must be abandoned, since M. de Lesseps has demonstrated, if not the mechanical impossibility, at least the financial impracticability of the route. But that does not mean that all idea of uniting the Atlantic with the Pacific by a navigable channel must be abandoned. On the contrary, the Americans, who always regarded the French scheme with doubt and suspicion, and who prophesied disaster when all seemed prospering, have been only the more incited by the failure of the Panama scheme to push on with their Nicaragua scheme; and it is this last which we now propose to explain.

Of course it is well known that for several centuries the idea has been entertained of a waterway across Central America, and among the many plans put forward from time to time, two routes have divided the favour of both geographers and engineers. The one, by way of the Isthmus of Panama, was attractive because there the dividing neck of land is at its narrowest. The other, by way of the river San Juan and Lake Nicaragua, has been approved because it offers fewer physical obstacles, and has the advantage of a natural waterway for a considerable portion of the distance. As early as 1550, a Portuguese navigator, Antonio Galvao, set forth some of the advantages of the Nicaragua route; but nothing was done for three centuries. In 1825, the republic of Nicaragua made overtures to the United States to co-operate in the construction of a canal; and from time to time since then, the attention of the Government and people of the United States has been directed to the scheme, especially since the opening up of California and the Pacific States has emphasised the need of a water-channel across America.

Without going into the history of the project and the negotiations attending the scheme, we may say that when General Grant was President he took it up with interest; and after he left office, he devoted his energies to get it carried through. General Grant was not successful, except in getting a number of surveys made; but the more M. de Lesseps went on spending money at Panama, the more did the eyes of the North Americans turn to Nicaragua. Finally was formed the Nicaragua Canal Construction Company, which has now begun work.

What may be called the initial movement in this new enterprise was the expedition which left New York on the 25th of May 1889, and arrived on the 3d of the following month at San Juan del Norte, or Greytown, where is to be the Atlantic entrance of the Canal. Here the party landed on a sandy uninhabited coast, without harbour or shelter and with no communication with the outer world—two weeks' travel from the nearest telegraph station, and two thousand miles from the base of supplies. Here they began at once to run up a temporary town, with stores, and then to erect a telegraph in connection with the nearest station. Parties were then pushed forward into the forest to form camps and make roads for the transport of material and supplies along the proposed route of the Canal; and by the month of October following, the preliminary organisation was complete, and the work of construction was begun.

First of all, the Bay of Greytown had to be formed into a harbour, for ships had to anchor

two miles off the shore, and it was both expensive and dangerous to land heavy machinery on the beach by small boats. A breakwater was at once begun, and under its shelter dredgers were put to work to deepen the channel to the inner bay; and by the time these lines are in print, it is expected that vessels drawing twenty feet of water will be able to pass safely inside and discharge alongside the wharfs of the company.

In the meantime, permanent quarters for the engineers and staff have been erected, with all the needful storehouses, hospitals, and public buildings. Material has been imported for the construction of an aqueduct thirteen miles long, to supply Greytown and the neighbouring works with water. Some two miles of railway and seventy miles of telegraph have been erected. Steam excavators have been put up and set to work; and several miles of the route by the Canal have been cleared and made ready for dredging. For the rest, the rivers have been made navigable for small craft to facilitate the transport of plant and machinery, which is constantly arriving, and is being distributed along the route and set to work without delay. In an incredibly short time, a great enterprise, of which people in Europe seem to know little or nothing, has been got under-way, and is being actively prosecuted.

Mr A. G. Menocal is the chief engineer of the Nicaragua Canal Construction Company, and to his several surveys and Reports we are indebted for particulars of the scheme. Mr Menocal's investigations extended, with intervals, from 1872 to 1885, and involved the examination of eight different routes between Lake Nicaragua and the Pacific, as well as of competitive plans on the Atlantic side.

In brief, it may be said that Lake Nicaragua, which is some one hundred and ten feet above the sea, is taken as the summit-level of the Canal; but in 1880 Mr Menocal was led to considerably alter the location of the line originally fixed on by Colonel Childs and others who had preceded him in the work of survey. He succeeded in taking out some of the curves and shortening the length of the Canal, while also decreasing the amount of excavation to be done according to former estimates. But before the company sent out material to begin the work of construction, there was yet another detailed survey, with the object of eliminating all doubtful elements, and arriving at an accurate estimate of the character, amount, and cost of all the work required for the completion of a canal adapted for the navigation of the largest vessels afloat, and for the maximum probable traffic.

All these precautions, and the business-like proceedings generally, show the American company in agreeable contrast to the rash enthusiasm and uncalculating optimism of the French company. It is not sentiment and lottery-prizes which incited and keep alive the American enterprise, but the true commercial spirit allied with the reasonable patriotic desire to keep the internal communications of the American Continent in the hands of the American people.

For two years and a half before the expedition left New York as mentioned, six land-surveying parties, one hydrographic party, and two boring parties, had been constantly at work, verifying

distances and levels, in cross-sectioning, locating locks, dams, embankments, railroads, drains, &c. The result of all this preliminary work has been to effect many improvements on the original plan, and to finally mark out the route which is now being followed.

On the Atlantic side, then, the Canal will begin at what was formerly known as San Juan del Norte, and is hereafter to be known as Greytown, where the river San Juan discharges the waters of Lake Nicaragua into the Caribbean Sea. Between the sea and the lake, however, navigation is obstructed by rapids, and also by the detritus brought down by the streams. On the Pacific side the terminus will be at Brito, which will be connected with the lake by two sections of canal and the basin of the Tola River. From each side the summit-level will be reached by three locks, but so placed as to secure the longest possible uninterrupted passage on the level. Thus, going from the Atlantic to the Pacific, the distance between the last upward and the first downward lock will be over one hundred and forty miles—a great consideration for rapid steaming.

The first nine miles from Greytown will be on the level of the sea, and practically a prolongation of the harbour. Then at about nine and a quarter miles the first lock will have a lift of thirty feet; the next lock, one and a quarter miles farther, will lift thirty-one feet; and the third lock, twelve and three-quarter miles from Greytown, will lift forty-five feet. After this, some low clay-hills have to be cut through until San Francisco Creek is reached. This is a portion of the river San Juan; and it is proposed to throw a dam across the mouth of the creek, so as to form it into an artificial lake from thirty to fifty feet deep.

A double purpose will be served by this embankment, for the passage of the rapids will be avoided; and the waters of the rapids will be utilised to deepen the river San Juan back to Lake Nicaragua. In fact, from the San Francisco Creek to the lake the river will be the channel, and will be converted into an extension of the lake. Thus, from the creek, vessels will steam uninterruptedly up the river, and across the lake as far as the river Lajas, where the Pacific portion of the Canal begins on the west shore of the lake.

The valley of the Lajas will be utilised as far as possible in deporting vessels from the lake to the Pacific Ocean. The descent is gradual, and will be effected by three locks. The first two (numbers four and five in sequence) will be pretty close together, and will lift, or lower, forty-two and a half feet each. The third (lock number six) is a mile and a half farther on, and lowers between twenty and thirty feet, according to the state of the tide. Between number six lock and the port of Brito, indeed, is a distance of only half a mile on the sea-level, and for this distance the Canal will be only an extension of the harbour, as at the Greytown end.

Brito, however, is not yet a harbour—it is only a roadstead. The company, therefore, design a breakwater nine hundred feet long, extending from a rocky promontory projecting from the beach at the western extremity of the range of hills, and a jetty eight hundred and thirty feet long. The deep water formed by these jetties

will be the proposed harbour; but this will be enlarged by excavating the alluvial valley so as to form a broad and deep basin three thousand feet farther inland than the present shoreline. From the inner side of this basin the Canal up to the first sea-lock will be an extension of other three thousand feet.

One thing in favour of the company is that the whole line of the Canal is well supplied with timber of excellent quality. That on the eastern division may be only suitable for temporary works during construction (as trestles, huts, &c.); but that on the western division is deemed suitable for all purposes. The rock needed for the dams, weirs, and embankments will be obtained from the adjacent cuttings through basalt and trap. Limestone for lime is also procurable in the western division, and fine clean sand is abundant in all the streams.

Then as regards water—Lake Nicaragua has a surface area of 2600 square miles and a watershed of 8000 square miles. The daily discharge by the lake in the wet season has been estimated at 1,272,530,600 cubic feet per day; whereas the requirements of the Canal will not exceed 140 million cubic feet per day, so there is plenty of margin.

The total length of the waterway from ocean to ocean will be 169½ miles; but of this, 121 miles will be unimpeded navigation in the river and lake, and 21½ miles in basins. There will thus be a distance of over 142 miles which vessels will be enabled to traverse at full speed. The length of actual excavated Canal will be altogether only about twenty-six miles, and eighteen miles of that will be wide enough to enable vessels of the largest size travelling in opposite directions to pass each other. The contracted portions are short lengths at each extreme end of the summit-level.

Allowing for the Canal portion the same speed as large steamers average on the Suez Canal; for medium speed on the river and basins; and for ten miles an hour across the lake—the total time of transit from harbour to harbour, including detention at locks, will be twenty-eight hours.

The traffic, of course, will be largely affected by the time required for a vessel to pass a lock. Taking forty-five minutes as the estimate for the lockage, and one vessel at a time, the locks could put through thirty-two vessels in one day, or 11,680 per annum. This, at the average tonnage of vessels using the Suez Canal, would give the working capacity of the Nicaragua Canal as equal to over twenty millions of tons per annum, a total never likely to be reached in our time.

Not much faith was rested on M. de Lesseps' estimate of possible traffic across the Panama Canal; but competent authorities think that six million tons per annum can be safely reckoned on to begin with, provided the transit-dues are not made too onerous to divert ocean traffic from the Cape Horn route, or some of the railway traffic from the northern Continent. Six millions of tons at ten shillings per ton ought to yield a revenue handsome enough to provide for maintenance and renewals, and also a fair return on the capital invested. We are not aware what dues the Nicaragua Company intends to impose, nor whether ten shillings per ton is a burden which would be compensated in interoceanic

traffic by saving of time and insurance; we merely give the rough estimate as suggestive of possible revenue.

With regard to the cost of construction, this will be comparatively little to what the Panama Company have thrown away. Some three miles in the eastern division have to be cut through solid rock at a cost of about twenty-two per cent. of the whole cost of the Canal; there will be some more expensive cutting in the western division; but of the twenty-six miles of constructed Canal, more than twelve miles will be made by simple dredging at sea-level. A considerable portion of the cost of such a work is in the transportation of machinery and appliances, and in the provision and transport of employees. Labour will have to be imported from the Central American and Gulf States, and this will be a heavy item of expense. But the climate, unlike that of the Isthmus of Panama, is salubrious, and in places exceptionally delightful, as the members of the survey-parties have thoroughly tested by long years of residence and exposure.

Thus, then, to sum up in the words of Mr Menocal, the engineer-in-chief—'It is believed that with an intelligent and business-like management, the Canal can be completed in six years for the work of actual construction, and one year in making the necessary preparations to commence active operations, and that the total cost will not exceed 90,000,000 dollars (say £18,000,000 sterling) exclusive of banking commissions, interest during construction, and other expenses not included in the engineer's estimate.'

It is not our business to criticise this calculation, even if we had the material for doing so. Our purpose is simply to describe the scheme and its progress. But one thing in its favour is the long and patient investigation which has preceded it, and another is the absence of promoter's profits which marred the Panama scheme from the very outset. In short, the American engineers seem to have been as cautious and minute as the French engineers were careless and vague. They are going about the matter as if they had no doubts of success; and we do not see why they should have any, from a mechanical point of view at any rate. Political and financial considerations may disturb later.

THE RING AND THE BIRD.

By C. G. FURLEY.

IN FOUR CHAPTERS.—CHAP. I.

It is about ten years since I went to live at Mrs Gretton's. I am an architect; my office was in Southampton Street, and is there still; you can see 'F. Laurence, F.S.A., Architect and Surveyor' on my door-plate any day; and it chanced just then that it suited me better to live in Bloomsbury than in the suburbs. I was writing a book on the old City churches, not by any means with a view to fame, but only as an advertisement of my qualifications which might catch the eye of the building trade; and it was convenient to be within easy reach of my subjects, and also to be so near my office that I

could run round for an hour's work in the evening when I felt inclined.

I was certainly fortunate in lighting on Mrs Gretton's. She lived in one of those long dull Bloomsbury Streets where nearly every house displays a card with the inscription, 'Board and Apartments.' Mrs Gretton's did not; but having called in succession at six houses that did, I rang her bell without noticing the omission. It was fortunate I did so, for more reasons than the simple one of personal comfort. But I certainly imperilled my chance of effecting an entrance into the cleanest and most comfortable house I had seen that day by asking the landlady if she had any lodgings to let.

'No, sir; I have not,' she replied stiffly. 'I do not let lodgings. I am willing to receive ladies and gentlemen of good character and social standing as members of my family, for my daughter and I find this house larger than we require for ourselves; but only as boarders. I do not let lodgings.'

This suited me well enough. A slice of the family joint is usually more appetising than a lonely chop; I really prefer to have a little society, especially at my meals; and Mrs Gretton, though she showed the nervous determined gentility of one who 'has seen better days,' was evidently a lady. Having given her what she considered to be sufficient guarantees of my character and social standing, I took up my abode in her house. She was an officer's widow, and her real reason for taking boarders was the desire to keep her little pension intact for her daughter Louisa. To lay by enough for Louisa to save her from ever having to work for her living, to accumulate a dowry for Louisa, if the Fates were kind and sent an eligible husband in her way—these were Mrs Gretton's ambitions. Meanwhile, Louisa would perhaps have been better pleased if her mother had thought less about the future and allowed her more pocket-money now.

She was a pretty girl, and dressed wonderfully well, considering her means; but she was discontented. The life of Bloomsbury galled her—its petty domestic duties, its dusting, its pastry-making, its monotony. On summer afternoons she would walk up to Hyde Park and sit in one of the penny chairs, watching the carriages and the riders, and saying that she ought to be among them, that if her father had lived she would have been. And so home again with a headache, and the consciousness that the hat she had trimmed for herself with such care had not the touch of Bond Street after all.

'Agatha is better off than I am,' she would say to her mother discontentedly. 'She has more money in her pocket, and she knows what her future is to be.'

'Hush, my darling,' poor Mrs Gretton used to answer to this plaint. 'You ought to pity poor Agatha—forced to go out and fight the world,

and with no prospect of anything better. It's so bad for a woman, makes her so independent and unfeminine. I am sure Agatha would have been much gentler and more clinging—as a lady should be—if she hadn't lived so long in lodgings with that wretched brother of hers. But I hope that now she has our society and your example, my child, the softer side of her nature will come to the front.'

I overheard this conversation, and it both amused and astonished me. Agatha March was not of a clinging nature, but I had not thought her unfeminine; and, moreover, I could imagine means of developing the softer side of her nature more efficacious than Louisa Gretton's example. In fact, I had already some such in my mind.

Agatha was Mrs Gretton's niece. She was perhaps rather too fond of styling herself a working woman, and I think she did so chiefly with a view to shocking her aunt, who could not get over the idea that any work done outside the realm of home was unlady-like and derogatory.

'Don't call yourself a working woman, my dear,' Mrs Gretton cried. 'It sounds as if you were a factory girl. You are a young lady whom family circumstances compel to give lessons in art—which is quite nice and lady-like, though I wish it was flowers or something pretty, and not those dirty street-boys. And you teach in a nice College with a Princess for its President; and I really think—yes, Agatha, I do—that you are insulting Her Royal Highness in calling yourself a working woman.'

'My dear aunt, don't deprive me of my proudest title, even to oblige the Princess, who, by the way, has never entered the College since the day she opened it,' said Agatha loftily. She knew how her aunt regarded her opinions, and, as I say, liked to shock her. Girls of the type of Agatha March often like to shock their aunts; they have broken the bonds of those conventions that tend to fill our towns and villages with wasted futile lives, and in the first joy of their freedom they would, or think they would, break all laws whatsoever. They will talk of marriage in a way to make your hair stand on end; they will resent your suggestion that all Anacreon wrote is not suited for their reading; they will cry out against the absorption of women in the narrow things of home, and spend a watchful night by the cot of a sick child, not necessarily their own—ay, even though they are pledged to deliver a lecture on women's suffrage on the following day; they are more full of exquisite inconsistency than ever woman was since time began. God bless them, these women of our day! Independent, intellectual, impatient of control, they are women, first and last.

These three ladies constituted the Gretton ménage when I first entered it. Shortly afterwards another member entered the family, to whom I must dedicate a few words. This was the parrot. Why Mrs Gretton, whose house-

wifely soul loathed dogs and cats so strongly, bought that bird I do not know. Perhaps because she was so much elated by a letter she had received that morning from Colonel Farrer—an old friend of her husband's, she was careful to inform me—who was coming home from India, and had asked if she could take him as a boarder for a short time.

'And really,' she explained to me, 'when I thought of seeing the dear Colonel again—a man who moves in the society I have been accustomed to, you know, Mr Laurence—and the poor animal looked so dejected and miserable, and the man who brought him to the door only wanted half a crown, and I thought perhaps the Colonel would be accustomed to parrots in India, and—oh dear!—I really couldn't help buying it.'

The reasons for the purchase were perhaps rather confused, but none of us analysed them too carefully, for somehow that parrot became a sort of centre round which the household converged. We all petted it; even I, who am no bird-lover, took an interest in its doings, and strove to educate it according to the best traditions of the parrot school; teaching it such phrases as, 'Who killed Cock Robin?' 'Polly, put the kettle on,' and in imitation of Sterne's starling, 'I can't get out; let me out.' Polly was a bird of intelligence, and picked up these sentences with wonderful rapidity. It practised them when alone and when no one was paying any attention to it, while at other times it would chatter vigorously in an unknown tongue, which I held to be the dialect of parrots, though Mrs Gretton, who was infatuated about the creature, declared it to be 'Sanskrit or Hindustani, or whatever they speak where it came from.'

'I believe you expect Polly and Colonel Farrer to hold conversations in Hindustani, Mrs Gretton,' I said once with sarcastic intention, for of late our hostess had spoken of only two subjects, the intelligence of the parrot, and the greatness of the coming Colonel. But it was never any use to be sarcastic with Mrs Gretton; she always took one's words just as they were uttered.

'Well, why shouldn't they?' she said. 'I am sure it would be a great comfort to Polly to have some one who could talk to it in its native tongue. I remember a poem that I learned when I was at school about a parrot that spoke Spanish, and, though it learned English, was comforted on its deathbed—that is, when it was dying—by a sailor coming and speaking Spanish to it. Of course Polly will enjoy talking to the Colonel. —Won't oo, my pretty pet?'

She went up to the cage, and began cooing to the bird in that mysterious lingo which women mostly keep for babies. But the babies usually take no interest in the sentences addressed to them, whereas Polly, when questioned about his desire to talk to the Colonel, winked and nodded and squawked out, 'Try it on, try it on'—he was a very slangy parrot!—in such a knowing way that I could not help laughing.

Although Mrs Gretton behaved like a doting grandmother to her pet, Polly did not by any means reciprocate her affection; the object of his love was Agatha. He learned her name without any teaching, and would cry out 'A-ga-fa, A-ga-fa!' in his most joyful squeal whenever she entered the room. When, after a fortnight's

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domestication, we began to let him leave his cage and move about the room, his great delight was to sit on her shoulder and rub a caressing head against her neck. How I envied the parrot at that time. Had my opinion of him then been what it is to-day, I have no doubt I should have been abominably jealous; though I must say that Polly always treated me with the utmost courtesy, and seemed in no way displeased that I should share his opinion of Miss March.

I admired Agatha March; I have always admired women who can stand alone. Such an admiration is, however, perfectly compatible with a desire that they—or at least some one among them—should not stand alone a moment longer than is necessary. There may be a certain cowardice in preferring to support strength rather than weakness; but in the vicissitudes of life a time is sure to come when the courage and capacity of the woman he loves shall be a man's salvation. To some, perhaps, the burden of a helpless wife may bring inspiration; but, for me, let me have a companion who can understand the struggle, a fellow-worker who can share the aspiration and the effort; a queen, whose clear eyes can judge the labour, whose hand can give the award.

I persuaded Agatha to accompany me in my wanderings among the City churches. She had sufficient knowledge to be an intelligent companion, and she had sympathy and insight—that touch of inspiration which generally goes with the higher grades of womanly intellect. While I studied a carving or a brass, she would draw from the inscriptions on the tombstones such hints of the lives of those who lay below as made the dead congregations live again—gray evanescent figures half seen in the dusty sunlight. Louisa Gretton came with us once, but she did not care for the sights we saw. The churches were dull, empty, and cold; they lacked the colour and variety she craved; and Agatha and I were glad to be rid of her discontented face and restless presence. Had she been a pleasanter companion, it is quite possible we would not have desired her more; there comes a time when all companions save one are wearisome and dull. Oh those hours among the dusty pews and worm-eaten pulpits, those walks along the crowded city streets! Don't tell me about flowery meadows and country lanes. Were I to go a-courting again, I would still choose the magic hills and dales of Holborn and Cheapside. The crowd threatens to jostle your lady, and you venture to take her arm—unreproved. Could you do that under the hawthorns? The stumbling words that would seem so flat against a blackbird's thrilling song are eloquence itself when uttered through the dull murmur of London traffic. Hearts press closer to each other in the stress of the throng; the constant risk of being parted makes union more desired. Give mountains and lakes and 'scenery' in general to those who need them; but my garden of romance lies in the busy Strand, in forgotten courts by Cornhill and Lombard Street, and in the gray silent Bloomsbury Squares.

Perhaps my book progressed but little during those days, although my studies for it were so persistent; but that really did not matter, for in time I hoped to have Agatha's help, and then we should get on quickly enough. But let me admit

that meanwhile I wrote hardly a line, and that I spent some of the money I had set aside for the publication of my 'magnum opus' in the purchase of a diamond ring for my betrothed.

Mrs Gretton and Louisa were very civil when Agatha and I came home one day and said we were engaged; very civil and congratulatory—and yet—Now, is it not strange! Louisa Gretton did not care a straw for me; her mother would certainly not have allowed me to marry her daughter without letting me know how unworthy I was of such a boon; and yet I could see they felt a little hurt that I loved Agatha. I believe there are some women who would carry etiquette to such a point that they would like a man, purely as a matter of courtesy, to propose to all the women who won't have him before asking the one who will.

'To think of you getting engaged, Agatha!' said Louisa, with a smile that was not sweet. 'I thought you despised marriage and all that.'

'Did you?' answered Agatha in an elaborately quiet tone, which I knew to be dangerous. 'You misunderstood me. I only despise the habit of regarding marriage as an easy means of getting a living, and shirking other work on the chance of it.'

Mrs Gretton had a reaction of kindly feeling after the first surprise, and even told me how glad she was that Agatha—who was quite alone in the world, poor girl; for that young brother of hers was worse than useless—should find a protector. But I doubt if Louisa felt much kindness.

We had been betrothed about a week, when, coming home one day, I noticed a subtle excitement pervading the house.

'What's up?' I asked Agatha.

'Have you forgotten?' she answered, smiling. 'The Colonel is coming to-day—autie's own dear Colonel Farrer. Dinner is to be on a scale of unparalleled magnificence—salmon and lamb and gooseberry tart. Louisa made the tart and the custard. I do hope the Colonel is worthy of the efforts we have made in his honour. It will break autie's heart if he is not a hero of romance.'

Mrs Gretton's illusions must have received a blow. The Colonel was not a hero of romance; he was a little, bad-tempered, red-faced man, who bolted his food and snubbed Mrs Gretton's attempts at civility. He was vain, I should say, judging by the elaborateness of his dress, the size of his watch-chain, and a really magnificent ruby ring which he wore on the little finger of his right hand, and which in the intervals of eating he constantly played with.

'Do take a little more tart, Colonel,' said our hostess; 'my daughter made it. Dear Louisa makes all our pastry. I think, you know, that it really requires a lady's light hand to make good pastry; and Louisa, though not one of those modern women who attempt all a man can do, is thoroughly acquainted with all womanly duties.'

'What an abominable row that bird is making!' answered the Colonel.

It was true. Polly was very obstreperous. He was dancing about his cage, flapping his wings and screaming, 'Let me out; I can't get out,' at

the top of his voice. We were used to his ways, but I have no doubt the Colonel found the noise very irritating.

Agatha turned to the bird. 'I'll let you out presently, Polly,' she said. 'Be a good bird now and don't chatter too much.'

Polly became quiet at once, ceased to flutter about his cage, and contented himself with murmuring 'A-ga-fa' at intervals. When we had finished dinner she released him. He at once fluttered to her shoulder, and there mounted, was carried up-stairs to the drawing-room, chuckling and cooing in Agatha's ear all the time.

While Louisa was making tea, her mother, undeterred by the Colonel's chilly manner, began to catechise him about his Indian career. 'For I know, dear Colonel Farrer, that you have seen service. I remember seeing your name in the newspapers lately—was it suppressing dacoits or protecting some poor oppressed creatures? Probably the latter,' said Mrs Gretton with a beaming smile; 'it would be so much more natural to you to protect the weak.—Do be quiet, Polly.'

Polly was again making himself audible, though not in a very objectionable fashion. He was creeping down Agatha's left arm now, saying, 'Who killed—who killed?' in an uncertain voice, as if he could not recall the remainder of the phrase.

'He is trying to remember "Who killed Cock Robin?"' I said. 'He hasn't managed to pick up that phrase very well.'

Polly paused to laugh in his shrillest tones, and then recommenced his march down Agatha's sleeve. To support him, she stretched out her hand, the hand on which her engagement ring gleamed modestly, and rested it on a little table on which her work-basket stood.

'Do tell us some of your adventures, Colonel,' Mrs Gretton went on. 'You must have had so many. Now, I am sure there is a romance connected with that beautiful ring you wear—such a splendid stone, I could not help remarking it!'

For once the Colonel looked pleased, as he twirled the ring on his finger.

'I suppose it is very valuable?' said Agatha thoughtfully.

'I should think so,' returned the Colonel. 'A good deal more valuable than that diamond you wear.'

Agatha's face crimsoned, and her eyes flashed. She withdrew her hand abruptly, somewhat endangering thereby Polly's precarious balance. But the bird fluttered back to her shoulder, and secure there, glared at the Colonel.

'Do tell us about the ruby,' persisted Mrs Gretton.

'Oh! I got it after a frontier disturbance—a thing, you know, that might have assumed serious dimensions if I hadn't nipped it in the bud. The natives pretended it was only a squabble between two religious sects; but these things always mean mischief—always. This ruby—ah—was in a sense the *casus belli*, so I—that is, it was advisable to remove it, and the Governor quite justified my action, so I retained it.'

'Just so,' murmured Mrs Gretton.

'Loot!' I remarked in a tone by no means subdued; but my criticism on the Colonel's proceedings passed unnoticed, for just at that moment

the parrot, safely perched on Agatha's shoulder, stretched out his head towards the Colonel and screamed in his most vindictive tones, '*Who killed Ram Asoka?*'

SPECTACLE GLASSES.

ALTHOUGH many opticians are in the habit of recommending various descriptions of glass for spectacles, there are in reality only two kinds—native glass or rock or mountain crystal, usually called pebble; and artificial glass. They also advise users of spectacles to have them of pebbles, as more beneficial to the eyesight, artificial glass being decried as heating and wearing the eye. The writer, who has now been habitually using spectacles for twenty-five years on account of short-sightedness, has had no such experience. Acting upon the advice of a first-rate oculist, whom he consulted, he purchased pebble spectacles, and he used them for years. Lately, however, requiring a pair of spectacles of a particular focus, he has taken to spectacles of artificial glass, and he finds that there is not the slightest difference, with the exception that the latter are only about half the price of pebble spectacles. This is a consideration in case of persons of limited means.

The perfection to which glass-making has now attained has rendered the use of artificial glass for spectacles practicable, and, seeing the advantages attaching to its employment, which it is the object of this short paper to point out, it is probable that it will ultimately entirely supersede rock-crystal. It was different, however, before the art of glass-making had attained its present perfection. The use of pebbles for lenses extends far back into the remote past. Sir Henry Layard found amongst the ruins of old Nineveh a polished pebble lens of a convex form of a focus of four inches, and a diameter of one and a half inch. It may also be assumed that the magnifying power of such lenses was well known to and utilised by the old cameo cutters in their difficult and delicate work. The price lists of opticians of former centuries contain the prices of pebble eye-glasses, and they are known to have endeavoured to improve the microscope by the use of crystals of precious stones. Besides rock-crystal, they made microscopic lenses of sapphire, ruby, garnet, beryl, topaz, and even of diamond. Diamond lenses for microscopes were warmly recommended by Sir David Brewster (1819), and made chiefly by Pritchard (1824). All these early efforts, after the marvellous development of the manufacture of glass, now belong to history. The greatest objection to the application of precious stones to optical purposes is their structure—the fact that, as crystals having two axes, they suffer double refraction, and it is this drawback which has to be taken into consideration when dealing with rock-crystal. This double refraction must greatly affect its optical application, and it can only be rectified to some extent by cutting the pebbles out of the raw material at right angles to the principal crystallographic axis.

Opera glasses with eye-lenses of rock-crystal have for some time past been made in Paris, for which great distinctness of image is claimed.

Closer examination, however, has proved that such eye-lenses are not only not better in that respect than those of ordinary glass, but mostly much worse, especially if they have not received the proper setting to the crystal axis. And if in opera-glass lenses the condition of cutting them out of the rock-crystal at right angles is neglected, this is much more so the case with pebbles for spectacles. As a matter of fact, in buying the raw material, the latter is sorted according to the use for which it is intended—for purposes of polarisation, prisms, &c.—and a certain quality suitable for cutting to axis selected for lenses and eye-glasses. But as it is known how irregularly the raw pieces of rock-crystal are formed, how its optical use is affected by cloudiness and 'cords,' or streaks, it may be easily guessed that in using this rather costly material the condition of cutting the axis at right angles cannot always be observed. As, lately, pebble glasses are being made on a manufacturing scale, in which the utmost utilisation of the raw material is the chief point aimed at, it follows that only a small portion is set at a crystallographic axis, and that rock-crystal is far inferior in its optical effect to ordinary glass.

It is very different with artificial glass as now manufactured for optical purposes. The ordinary white glass is made of a purity and freedom from colour which leaves little to be desired. But a greater degree of hardness might be imparted to it, especially if it is intended for eye-glasses without a frame. Besides colourless glass, however, a coloured raw material is made, chiefly intended for the protection of weak eyes. Formerly, green glass was much used for protective spectacles, and Arctic travellers have been very glad of them. But green glass extinguishes violet, red, and even blue rays, and causes objects to appear in dirty colours. Spectacles of blue glass, coloured with cobalt, are therefore to be preferred. Adams is reported to have been the first to recommend the use of blue glass; but they were at first more widely used in Germany, chiefly through the recommendation of the great oculist Gräfe, of Böhm, and others. The blue colour of glass is chiefly to be recommended because it absorbs those rays in their passage which belong to the yellow and orange portion of the spectrum, in which the greatest brightness and greatest heat are concentrated, and the eyes, especially weak ones, are consequently greatly protected by the blue colour, while rays which such eyes are able to bear obtain access. The material for blue glasses, which has to be made in various shades to suit individual eyes, is somewhat less hard than that employed formerly for green spectacles, and is also inferior in that respect to white glass, but it has gained in durability compared with former descriptions of glass.

Still greater is the progress recorded in the manufacture and hardness of 'smoked' glass, also used for protecting the eyesight. This kind of glass, which is coloured gray or mouse-coloured by the addition of manganese, formerly suffered from too great softness by the addition of a large quantity of lead; but the best manufactures now made are nearly equal to white glass in point of hardness. The object of smoked glass is to reduce the glare of light without segregating colours.

Spectacles are also made of intensively yellow glass, but the use of this glass is almost exclusively confined to glasses employed for firing purposes. Yellow glass extinguishes completely all other colours, and this is suitable in cases where distinctness of objects aimed at is of prime importance.

OX-EYE CAÑON.

A STORY.

THREE years ago I spent a week at Barkerville, in Cariboo of British Columbia, and a singular incident happened in which I had a part. I was with a Roman Catholic missionary, who had been sent from the south to look after certain of his fellow-churchmen in this remote and desolate little place. My friend was known in Barkerville, and was welcomed with a heartiness that showed how dull the unfortunate citizens found life in general in their isolated settlement among the mountains. He soon had a little programme of work mapped out for him. There were two marriages for him to solemnise; three little children had been born since the last mission visitation, and had therefore to be baptised; and if he would only consent to tarry two or three days, he was assured he would be able to brighten the last hours of a certain weather-worn and time-chastened old settler by promising to read the burial service over him at his grave.

A most forlorn place this Barkerville seemed to me in A.D. 1887. The sidewalks of its street were some six feet above the level of the roadway—so called by courtesy alone—which, when the rains descended, was a raging torrent, to be crossed only by light bridges. It was October when we were in the place, and they had already had their first severe frost of the season. The snow lay in the mountain hollows pretty thick. A thermometer of thirty or forty degrees below zero was, we were told, nothing out of the way as an experience; and the summer came so late and departed so quickly that the life seemed all winter.

The industry of Barkerville is gold-digging. That explains all. The few score scarred and wrinkled inhabitants of the town would have stayed here for nothing in the world but gold. And yet they confessed that the palmy days of Barkerville seemed quite gone. Not now, as in 1858, could they afford to give the mission priest a fee of two hundred dollars for performing a marriage ceremony. The gold pieces which they contributed at the mission collections were now very, very few. Existence, from being lively, had become flat. The river-beds and the rocks yielded them enough gold to keep them alive, but not enough to enrich them. Everything of merchandise was frightfully expensive, because of the difficulties of transport for more than three hundred miles over the mountains. Thus luxury was at a low ebb with them. I have seen more comfort among rough islanders of the North Sea than among these Anglo-Saxons of British Columbia, whose finds gave them an income of from two to five hundred pounds a year.

The yarns the veterans of the place had upon their tongues were of a kind to which the Californian writers have accustomed us. They

reeked of murder for gold, the pistolling of one man by another with as little remorse as if the man killed had been a dog instead of a human being, and of dark deeds done in secret for the sake of women as well as lucre. I daresay with a little tricking-up they could be made to appear delightfully romantic. Told as they were, however, in a wretched shed which passed as a tavern, with a dozen or more disappointed and indifferent miners, grimed and ragged, crowding round a big stove, smoking bad tobacco, spitting, and drinking rum, they did not have a very exhilarating effect. They all seemed to harp upon one key. Nature led those poor mortals dance after dance in quest of the gold: from river-mouth to river-source; from alluvial plains to mountain-tops: now humouring them with a prospect of wealth enough to turn their ardent heads, and now setting them face to face with death from starvation, though the gold pouches on their backs were heavy enough to gain them eternal credit from any baker in Christendom—and generally, at the end, snuffing out their lives before they could return to the homeland where wife and children awaited them.

'Sir,' said one old graybeard in a faded red and black check shirt—'you bet your life these here hills could tell some fine tales about them times. There's many and many a poor devil of a fellow been lost in them as I knows of, with and without his gold. The darned redskins ain't far wrong in saying they're haunted—that's my belief.'

'That's stale rubbish!' growled another, with an impatient start of his shoulders.

'Oh, you, Jeff Perkins,' observed the graybeard, with a thin smile of sarcasm, 'you'll never believe anything until you feel the worms biting you. Ox-eye Cañon's a joke to you, and always was.'

'Anyhow, I reckon, *that* spirit has been laid this many a day.'

'It may have been. And many a year, too, for it began to walk in '60, as I mind. But I call it infidelism, I do, to go setting your own little bit of mind against what we know to be true.'

This colloquy somewhat excited my interest. I asked if there was an Ox-eye Cañon ghost, or anything of the kind.

'There was,' said the old fellow; and then he looked amongst his mates, as if hesitant to say more. I did not press him; for I had seen enough of him to know that if he meant to tell the tale he would soon tell it without urging; and if he preferred not to tell it, no coaxing could make him tell it.

Well, two days afterwards, I was off among the mountains after wild goats. A Barkerville man and the priest's Indian servant were with me, the latter more especially for the sake of following bear, if we were so lucky as to hit a fresh trail. It was a lovely day—the sky blue and cloudless; and the air, they said, wonderfully mild for Barkerville. It was like a brilliant September day in old England: something very hard to beat. And so we were in excellent spirits, and clambered about among the pines and quartz rocks in very high spirits, and I, for one, determined not to mind very much if we got neither goat nor deer nor bear. As luck would have it, we sighted only two or three goats, and these two or three made off too fast for my gun. By lunch-time we were

very hungry, not a little tired, and considerably knocked about by the sharp rock-edges. We had wandered a good many miles.

'We are so near Ox-eye Cañon, that if you can hold on another hour, I'd like you to see it,' said the Barkerville man when I mentioned the luncheon basket.

'By all means,' I replied. 'But I thought it was nearer the town.'

'Oh no; or else, I reckon, Barkerville 'ud go into a pretty rapid sort of decline.—You remember the Ox-eye spirit, don't you?' (to the Indian).

The guide shook his head.

'Ah, well, if you don't, you ought. Fellows who do, describe it as a voice—mournful and sweet, you know, filling the cañon like an Æolian harp. For my part, I don't know what to think. I'm a bit spoiled in the spirit-way, because I never saw one, to talk to.'

We crossed a bold *arête* of white rock with not a single tree upon it, but with jagged peaks, snow-tipped, upon either side of the pass. Then we descended by a most dreadful slope of boulders, at as sharp an angle as a man may clamber down whole of limb. When we had got about half-way towards the broadish valley bottom beneath us, there appeared a dark rift in the mountain close under us to the left. At first, I thought it a natural tunnel. Later, I saw that it was not a hole, but a ravine, very narrow, with the cliff sides forming a wall not less than a thousand feet high upon either hand. The odd thing was that though at the mouth of the cañon the width between the walls was narrow enough, it was narrower still at the summit. There, indeed, it looked as if a man could have leaped across the frightful chasm.

'That's Ox-eye Cañon,' said my Barkerville friend. 'A nice gloomy sort of place, ain't it? However, we'll feed just outside in the sun; and afterwards, if you like, we can have a look at it.'

Our meal was soon made. We got through it the quicker because the Indian left us on a sudden, with a shout warning us not to follow him. He had some notion of catching game in his own way. The Barkerville man lit his pipe and stretched himself against a boulder.

'There's nothing in that cañon to see, after all,' he said, 'nothing worth the trouble, anyway.'

'Well,' said I, 'if you don't mind being left alone for a few minutes, I would like to have a look at it, since we have come so far.'

'Do so,' said he, well pleased to escape the task of cicerone. 'But mind the shafts—they're bad sort of places.'

It was by no means an easy piece of work, this clamber of mine into the pass. Road of course there was none. There was a slip of a river in the bed of the cañon, with a rubble of rocks in it. And this stream was the highway—until I had gone about a quarter of a mile. Then, however, the ravine widened, and the walls on either side changed to rough slopes, with rocks in plenty about them, and here and there the wreck of a pine, which had lived a little while, and then died—probably because it wanted more sunlight and air than it was likely to get.

Something made me scramble up one of the slopes away from the water. The rocks stood on end here more like those of the Druids at Stone-

henge, than as if they had merely rolled from the overhanging cliffs at one time or another. Here I first discovered what my companion had meant by warning me against the 'shafts,' as he called them. Really, they were certain fissures in the ground, as if the heat of a phenomenal summer had parched the soil until it was fain to crack and gape with thirst. I all but slipped into one of them in my endeavour to climb over a particularly big boulder.

This lasted for about half an hour, until I assured myself that I could see to the other end of the canon. It was certainly a forbidding place, and the night-chills already seemed to have entered it.

I turned to retrace my steps. But almost immediately I found myself on the edge of one of these fissures, in which I could see a gleam of something white. It was a cleft perhaps twenty feet in depth, with sides absolutely perpendicular. I looked again, and then had no doubt about it. The round white thing was not a stone, but the polished skull of a man. Then the tales I had heard in Barkerville recurred to me. Perhaps this poor fellow was one of the many miners who in the fifties had got their twelve or twenty dollars' worth of gold daily from Dame Nature. He had in time satisfied his lust for gold, and was returning to the south afoot and alone when—

At anyrate, the matter was worth investigating. It was not yet noon. We could spare an hour in getting this poor trapped corpse out of the earth in which it had been entombed as a living man. And, as fortune would have it, the Indian had been saddled with a light coil of rope for use in any climbing emergency during our pursuit of the goat.

The Barkerville man was loth to stir, but I persuaded him; and the Indian having returned, with the skin of a silver fox which he had snared in some uncanny native fashion, we all three soon found ourselves at the grave-side. I must say it went slightly against the grain to shift the unfortunate skeleton as we did. But it was just possible we might learn something of its identity when alive by hauling it up. And so, we made a noose and dropped it about the ribs, tightened the cord, and then brought the whole framework of bones to the summit as if it had been a bucket in a well. It was a framework of bones and nothing more. The teeth alone remained, strong and white and even, in proof that the poor creature was in the prime of life when he slipped of a sudden into the jaws of death. There was a clog of ice about the feet, which told of the temperature in the dreadful hole, and suggested that before dying the poor fellow must have suffered other agonies as well as those of starvation, and cramp, and a gradual loss of the hope of rescue.

We were looking at the skeleton and conjecturing about it, when the Indian broke into an exclamation and pointed down the pit. I did not catch his words, but the Barkerville man did. He, too, strained his eyes into the depths of the fissure; then he turned round toward me. 'The fellow is right,' he said. 'There is a little bag—a sort of satchel, you know—and some bits of stuff like rags. Anyway, we may as well get the bag out.'

But it was not an easy business. Again and again we tried to noose it, and always in vain. The 'Me go down, boss,' of the Indian came as a welcome proposition; for we had now no time to spare, if we were to be back in Barkerville by nightfall.

We hitched the rope fast to a rock, and let it hang into the hole. The Indian was soon down; and having cut the bag out of the ice, and looked about to see if there was anything else worth removing, but in vain, he came to the surface again, by no means with the ease he had descended.

The bag was initialled J. F. It was heavy and swollen. I suppose, therefore, no one of us was surprised when we opened it to find it crammed with gold-dust. There was further a piece of paper with some faint writing upon it, the interpretation of which was beyond us, both then and when we were back in the settlement.

We buried the poor fellow in another and much shallower 'shaft,' which we had no difficulty afterwards in half filling with loose soil. Then we made all haste homewards. It was weary work climbing and descending the mountains again; but we felt the fatigue a good deal less with such a subject for conjecture among us.

That evening there was some excitement in Barkerville. Every male adult in the place had heard the news, and crowded into the tavern for his share of information and the spoil. By right of possession we three might have kept the others at a distance from the bag of gold-dust, had we so chosen. But, for a wonder, my friend was not very avaricious; and the Indian was likely to be overruled. There were a hundred and twenty-seven ounces of dust in the bag, which were valued roughly at between four and five hundred pounds.

The saloon keeper did a rattling business that evening, on the strength of this contribution to the town's finances. It was observed, however, that while the other men were so jovial and excited, the old fellow whom I have already mentioned sat apart, with an expression on his face as if he were thinking profoundly. He had examined the bag closely at the first, and now and again he continued to look at it. Of this the others did not take much notice, until they began to play cards. Then one of them, with a strong word or two, remarked that old Pete was hatching some remarkable tale.

Old Pete heard the words. At the same moment, however, he slapped his thigh heavily with one hand and said: 'I have it. I thought I remembered something to do with a J. F.'

'Let's have it,' cried several of the others.

'He was knifed, and his name was John Ferguson; and they missed his ounces afterwards, so it was put down as murder.'

'Then this stuff'—began one of the others, and then stopped; while a doleful 'Oh!' sounded from several pair of lungs.

'Hang sentiment!' exclaimed one man bolder than the others. 'Or, better still, get the parson to bless it for us—that'll make it all right; and here he comes.'

The tale was soon told to my friend the missionary. It was really quite impressive to mark the eagerness on the faces of these rough-and-ready fellows while awaiting what he would

say in the matter. The fact that it was Ox-eye Cañon gold had much to do with their superstitious self-restraint.

The missionary was quite willing to give the gold his benediction; but before doing so, he reminded the Barkerville people so eloquently about certain vague promises they had made him to build a mission church, that it was very clear he did not mean them to have the gold all to themselves.

In effect, half of it was devoted to the church, and the remainder, duly consecrated, was divided among the townsmen. The share I received I wear to this day in the form of a somewhat massive flat locket, with a portrait in it.

As for the Ox-eye Cañon voice, very little wit was necessary to explain this. The luckless fellow who had first murdered John Ferguson, and then fallen into the 'shaft' in his attempt to get away scot-free, would be likely now and then to shout for help while life remained in him. The sides of his grave and the adjacent rock-walls no doubt made his voice seem most inhuman; and the sound of it would drift up or down the cañon like a cry shouted into a tube, until the very echoes had died away completely.

PHOTOGRAPHY AT NIGHT—A NEW DEPARTURE.

THE vast strides made of late years in every branch of the photographer's art are everywhere apparent; whilst, since the important day when the first dry plate was placed on the market a scientific and commercial success, the ever-increasing army of amateur workers in this fascinating pursuit bears ample evidence of the widespread interest and abundant popularity of this comparatively new branch of applied science. A further development—namely, photography at night—has now been so far advanced that it may fairly claim to have passed the experimental stage, and ere long cannot fail to command considerable attention and occupy a sound commercial basis.

As our readers are doubtless aware, sunlight or ordinary diffused daylight is essential for the impression on the sensitised plate of the object focused on it, gas or candle-light being powerless to produce such a result. The electric arc-light will, it is true, produce such a result, but is only available in exceptional circumstances, and then requires an exposure of some duration. Advantage has accordingly been taken of the fact that a flash of magnesium light is sufficiently powerful to effect an instantaneously desired object. Simple as such a solution of the problem of photography at night may appear at first sight, it has nevertheless taken a considerable time and many experiments before the arrangements were perfected, and the operator enabled to secure, with certainty as to immunity from failure, photographs of artistic excellence and commercial value.

The apparatus employed may be briefly described. On a tall vertical standard, placed so as to light the room as advantageously as possible, without of course itself appearing in the picture, are fitted some four or six arms, according to the size of the room; to each arm are secured two or

three lamps. The lamps are of special but simple construction, each having a circular wick fed with spirits of wine from a small reservoir. A receptacle beneath each lamp is filled with magnesium powder, a nozzle running up through the inside of the circular wick giving the powder a means of passage through the flame. Each magazine of magnesium powder is fitted with an india-rubber tube, the different tubes being ultimately brought together and connected, terminating in an india-rubber ball. The camera having been set up, the objects or group to be portrayed are duly focused, this being accomplished by means of a candle held near the object, it being otherwise impossible by lamp or gas light to see them in the camera sufficiently distinct to admit of accurate focusing. All being in readiness, the spirit-lamps are lighted, the lens uncapped; and the india-rubber ball being sharply squeezed, a blast of air is driven simultaneously through each lamp, forcing the magnesium powder through the flame, and a brilliant flash of illumination lighting the apartment, the desired picture is secured.

How wide a field the perfection of this new departure in photography opens out will be readily apparent. Banquets can now be successfully portrayed and evening assemblages of eminent personages perpetuated. Records can especially be secured of ballroom scenes, whilst in the case of those in which fancy dress is worn a brisk demand can hardly fail to arise for portraits which can be secured on the spot, without the trouble of subsequent journeying by daylight in character to the nearest photographer. Interiors of churches and other buildings now so dark as to be practically beyond the photographer's powers, can now be made amenable to his art; and a wide range of similar uses will readily present themselves to the minds of our readers, and there can be no doubt that this new branch of the 'black art' will ere long command very considerable attention.

STRENGTH AND LOVE.

Hope not that many here
Will ne'er mistake thee,
Nor faint with sudden fear
If all forsake thee;
No friend or comrade need
To cheer thee to thy goal;
Others thy mind may read,
But not divine thy soul.

And if a friend, perchance,
Or maiden lover,
Who meets thy spirit's glance,
Thou should'st discover;
And if when hand touch hand,
Thy heart grow stronger;
And if thy soul demand
Silence no longer—
Then take thy fate divine;
Let nothing ever part
Or keep that other heart
From being one with thine.

H. W.

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